DOCUMENT RESUME

ED 025 970 FL 001 033

By-Sweet, Waldo E.

The Continued Development of the Structural Approach.

Joint Association of Classical Teachers, Oxford (England).
Pub Date 67
Note-20p.
Journal Cit-Didaskalos; v2 n2 p141-159 1967
EDRS Price MF-$0.25 HC-$1.10
Descriptors-Audiovisual Aids, Classical Literature, Instructional Materials, *Language Instruction, Language Skills, Language Teachers, *Latin, Linguistics, Multisensory Learning, Programed Instruction, Second Language Learning, *Structural Grammar, Teaching Machines, *Teaching Methods, *Textbook Evaluation, Textbook Preparation, Traditional Grammar
Identifiers-Artes Latinae: Latin--A Structural Approach

A brief discussion of traditional Latin textbooks is followed by a survey of the first attempts at new materials (emphasizing integration of audiovisual aids and texts) at the William Penn Charter School and at the University of Michigan. The body of the article considers the structural approach, using "Latin: A Structural Approach" (1957) and "Artes Latinae" (1966) as representative texts. Development of programed instruction by the Encyclopaedia Britannica Films, Inc. and its future possibilities for Latin instruction are also treated. A 25-item bibliography concludes the article. (JH)

ED025970

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
OFFICE OF EDUCATION

THIS DOCUMENT HAS BEEN REPRODUCED EXACTLY AS RECEIVED FROM THE PERSON OR ORGANIZATION ORIGINATING IT. POINTS OF VIEW OR OPINIONS STATED DO NOT NECESSARILY REPRESENT OFFICIAL OFFICE OF EDUCATION POSITION OR POLICY.

The continued development of the structural approach

WALDO E.SWEET

FL 001 033

Reprinted from *DIDASKALOS*

The Journal of The Joint Association of Classical Teachers

Volume 2 no.2 1967

"PERMISSION TO REPRODUCE THIS COPYRIGHTED MATERIAL HAS BEEN GRANTED BY DIDASKALOS

TO ERIC AND ORGANIZATIONS OPERATING UNDER AGREEMENTS WITH THE U.S. OFFICE OF EDUCATION. FURTHER REPRODUCTION OUTSIDE THE ERIC SYSTEM REQUIRES PERMISSION OF THE COPYRIGHT OWNER."

The continued development of the structural approach

WALDO E. SWEET

Editor's note: Many readers will have heard of the pioneering work of Professor Sweet in exploiting the techniques of applied linguistics and of programmed learning for the development of radically new Latin courses, and will welcome an account from his own hand of the development of his ideas. It is proposed to devote much of *Didaskalos* volume III no. 1 (1969) to a discussion of Professor Sweet's work and that of Mr Sidney Morris and others, and in particular of the Cambridge School Classics Project, in this field.

INTRODUCTION

The text *Latin: A Structural Approach* (1957) rejected most of the traditional techniques for teaching Latin and substituted others. *Artēs Latīnae* (1966), a multi-sensory programme with many components, goes much further in its innovations. This paper will try to present an account of the development of these materials and the rationale behind the changes.

Description of the Traditional Texts

Twenty years ago, texts and teachers of Latin relied upon five techniques:

1. Latin-to-English stimulus and response ('translation'),
2. English-to-Latin-stimulus and response ('prose composition'),
3. production of morphological items out of context ('forms' or 'paradigms'),
4. analysis of the semantic meaning of the translation ('grammar'),
5. paired associate learning of Latin words with one-to-one English meanings ('vocabulary').

Text-books varied mainly in the amount of emphasis which they placed on these five techniques. The 'analytical' method presented a grammatical structure, illustrated it by Latin sentences, usually in isolation, and then required the student to produce the structure by turning English sentences into Latin. The 'reading' method, also called the 'functional'

method, relied mainly on stories written in easy Latin. Grammatical explanations usually came after the student had been using the structure for a while. The paradox involved here seemed to bother no one: how could the students read Latin which contained structures which were unknown to them?

It goes without saying that there were gradations between these two types. Also purposely omitted from this brief survey are such texts as the *Living Latin* series by Wilbur L. Carr and the books by W. H. D. Rouse and his followers, since they were not widely used in America and did not come to my attention until after I had begun to construct my own materials.

THE FIRST ATTEMPTS AT NEW MATERIALS

In 1946 I had the good fortune to become a member of the William Penn Charter School in Philadelphia. The headmaster, Dr John F. Gummere, interested me in modern linguistic theory. I bristled when I read Bloomfield's words, 'Our schools and colleges teach us very little about language, and what little they teach us is largely in error'.[1] It was a shock to realize that a century of scientific investigation of language had gone almost unnoticed by teachers and authors of texts.

During World War Two, however, there had been a need to train men to learn languages for which there were neither texts nor teachers. The government therefore had called upon the structural linguists, who constructed texts and taught exotic languages with the aid of native speakers.

There was no 'linguistic method' in the sense that the structuralists agreed on pedagogical matters. However, they all shared the belief that the first step in constructing learning materials was to analyse both the target language and the student's own vernacular. By laying the grid of one, so to speak, over the other, the linguist could spot the points of difficulty. It seemed reasonable that a contrastive analysis of English and Latin would be fruitful.

Authors and teachers had previously assumed that Latin and English, while they differed in superficial ways, were still fundamentally alike. Classical publications and texts were full of such comments as these:

[1] *Outline Guide for the Practical Study of Foreign Languages* (1942), 1.

'Its [Latin's] grammar is exactly like Anglo-American.'[2]

'Observe also that the parts of speech and other grammatical concepts are the same in other languages as in English.'[3]

'It is a pedagogical mistake to use Latin word order in secondary education.'[4]

Perhaps the most charming admission of the inadequacy of the traditional grammar of the last few centuries was made by Priestley, whose words I find quoted with approval by the author of an English grammar published in 1846:

'I adopt the usual distribution of words into eight classes, because, if any number, in a thing so arbitrary, must be fixed upon, this seems to be as comprehensive and distinct as any.'

To be frank, neither Latin teachers nor authors, with rare exceptions, knew anything about the structure of English. In particular, they were unaware of the signalling devices of word order.

The difficulty was that what was called 'grammar' was actually an analysis of the meaning of the utterance. This can be illustrated in countless ways, but perhaps the parts of speech are as fundamental as anything. Traditionally a student learns that a noun (in any language) is the name of a person, place, or thing. But this means that before he can tell what part of speech a word is he must know its meaning. In other words, he has to know the language first before he can use the grammar. And even then, the definition is faulty; 'conversation' is surely a noun and yet it is an action, not a person, place or thing.

To the structural linguist a noun, like any other part of speech, is a form class of a specific language, with its own morphological and/or distributional characteristics. A student presented with a text of Tetelcingo Nahuatl can identify the nouns without knowing what the text means if he is told that nouns have the morpheme *-tl* with four allomorphs, *-tli*, *-li*, *-tsī*, and *-tū*. A noun in English has a special form to show plural number and a genitive case and fills certain positional slots in a sentence, like 'The conversations were interesting'.

A contrastive analysis of English and Latin quickly led me to the conclusion that the most significant contrasts were the distinction between subject and object and modification of

[2] 'The Menace to Curriculum Reform', *Classical Journal* 44 (1948-49), 293-7.
[3] W. W. Blancké, *General Principles of Language* (1935), 249-50.
[4] J. C. Morgan, 'Streamlined Latin', *Classical Journal* 47 (1951-52), 231.

nouns by adjectives. In English these structures are signalled by word order, as these contrasting sentences show:

The man watches the black hose.
The black man watches the hose.
The Black Watch mans the hose.
The man hoses the Black Watch.

It now became clear why students had been able to read 'easy' Latin, which contained structures which they had never seen, with no explanation. The writers had fallen into a deadly trap. In order to make the Latin easy they had written it in English word order, with the trivial exception that the verb came regularly at the end of the sentence. In fact it was standard technique to tell the students to go to the end of the sentence to find the verb. They were thus recognizing verbs by the English signal of position rather than by the Latin signal of morphology. There was no sentence like *Hilarem datōrem dīligit Deus* (2 Corinthians) to let them see the contrast between the two languages; this is the third sentence the student sees in the *Artēs Latīnae* programme. Adjectives came next to the noun they modified, as in English. Again, there were no models like *Parva necat morsū spatiōsum vīpera taurum* (Ovid), the 21st sentence of *Artēs Latīnae*, with adjectives separated from their nouns.

It was difficult for teachers to believe that this could be true. Consequently teachers in my methods class were asked to analyse the text they had used the previous year and report any deviations from this standard word order. Exceptions were almost non-existent.

Study of linguistics indicated that the traditional description of the Latin noun was needlessly complicated. A simpler and more accurate description would permit nouns to be presented horizontally rather than vertically; that is, instead of learning all five cases of a first declension noun the student would learn the nominative and accusative of all five declensions, excluding neuters. As far as the student knows at first, he is learning only two forms, one ending in {*-s*}, like *agnus*, *vulpēs*, *manus*, and *diēs*, and one ending in {*-m*}, like *agnum*, *vulpem*, *manum*, and *diem*, noticing that long vowels become short before final /*-m*/. The next step is to introduce nominatives which have the zero allomorph for nominative singular, like *fēmina*, *vir*,

and *dator*. Only when he reaches the ablative does he learn that there are five declensions. Neuters are introduced later.

Verbs could be introduced in the same way, the third person singular active of all four conjugations. This horizontal approach makes it possible to read Latin *sententiae* from the beginning.

Finally, study of traditional texts showed that in another important respect the Latin which the students studied was badly distorted. Latin vocabulary items were assigned a one-to-one English equivalent. *Rēs* meant 'thing', and the learner was rewarded for matching up this pair. His behaviour was further reinforced by the readings, in which sentences like *Rem nōn spem, factum nōn dictum quaerit amīcus* (from *Carmen dē Figūrīs*), the 33rd sentence in *Artēs Latīnae*, were never permitted to appear and confuse the beginner.

Although classical Latin exists of course only in printed form, the argument of the structuralists that language was primarily oral–aural behaviour suggested that the learning process would be more efficient if students spoke and heard Latin in the classroom and if they could also practise these skills in exercises with wire recorders, disks, and tapes.

Unlike the exercises in today's *Artēs Latīnae* programme, which are almost exclusively Latin-to-Latin, these first drills (called 'Pattern Practice') were entirely English-to-Latin. The differences between them and traditional prose composition were threefold:

1 the activity was oral-aural, not written,
2 the sentences were in 'minimum contrast'; that is, only one item at a time was changed, so that the student went from 'The family has a father' to 'The family has a son', to 'The father has a son', and
3 the assumption was that language learning consists of forming habits of automatic response rather than the slow and painful solution of complicated problems.[5]

To elicit a response, some kind of stimulus is necessary, and it was apparent that visual stimuli would be better than English sentences. Consequently I made slides from pictures in textbooks and asked Latin questions, much in the manner of

[5] This assumption has been modified in the *Artēs Latīnae* programme. It now appears that language learning is *both* automatic acquisition of habits *and* problem solving. If problem solving did not enter into the process, a speaker of a language would never be able to construct an utterance which he had not heard before or indeed even to understand a new one. In learning to read and understand a sophisticated literature like Latin, problem solving is of great importance.

Rouse, with whose work I was now familiar. These questions, like those of Rouse himself, were 'instinctive'. There was no understanding of the process of question and answer, no knowledge–only trial and error–of the difference between a difficult question and an easy one, and no way to explain to someone else how to proceed.

In order to break up the Latin sentences and compel the student to observe the morphological signals, stories from a traditional text, with the permission of the publisher, were typed out word by word or phrase by phrase and flashed upon the screen. The students were trained to respond to *Caesar* as 'Caesar does something', while *Caesarem* meant 'Something happens to Caesar'. Another advantage of having the text projected in this way was increased concentration by the students; they were all looking at the same words at the same time.

THE PENN CHARTER MATERIALS

A grant from the Rockefeller Foundation made it possible for me to go to the University of Michigan in the summer of 1950 to construct a text to be used in a three-month Latin course for a class in general language. There were Pattern Practices, almost entirely English-to-Latin, and stories, where an attempt was made to avoid English signals of position. The approach was multi-sensory. In an unpublished rationale of the course written at that time I find the following:

> 'No one avenue of approach should be used to the exclusion of all others. Some people learn better by one method than by another; almost everyone can learn faster if two or more approaches are used simultaneously. In this course we employ visual, oral, aural, and kinesthetic activities.'

One of the most obvious faults of the materials was their extreme density. The three-month course occupied only 43 mimeographed pages. There was an ignorance of a number of significant contrasts which were presented to the student without explanation. Here is the first lesson.

> Quis est? Puella est. Quid vidēmus? Canem vidēmus. Puella canem videt sed canem nōn amat. Puellam terret canis. Puella nōn est valida. Puella puerum vocat. Canis puerum nōn terret quod puer est validus. Puer eum pellit. Puerum amat puella quod puer canem pellit. Puer puellam amat quod puella pulchra est.

Quem vidēmus? Fēminam vidēmus. Fēmina canem videt et amat. Fēminam canis nōn terret. Fēmina virum vocat, sed vir canem nōn pellit. Canem amat. Fēminam et virum canis amat quod vir eum nōn pellit. Sed puellam et puerum nōn amat.

There were then the following questions:

Quid puellam terret?
Quem vocat puella?
Quis vocat puerum?
Quis canem amat?
Quem fēmina vocat?
Quis fēminam et virum amat?

Apart from the inanity of the story, the student was presented with these contrasts in this first lesson:

1 four parts of speech which change form (nouns, verbs, adjectives, and pronouns) and those which do not change form (*sed*, *nōn*, *quod*, and *et*),
2 three signals for nominative singular, *–s*, zero, and *–d*,
3 two signals for accusative singular, *–m* and *–d*,
4 personal and non-personal pronouns (*quis* and *quid*),
5 transitive and intransitive verbs (*est* and *videt*),
6 different person and number of verbs (*videt* and *vidēmus*),
7 *est* as an intransitive verb (*Puella est*) and as a copulative verb (*Puella est valida*),
8 masculine and feminine gender (*validus* and *valida*),
9 main and subordinate clauses, and
10 omission of subject.

Many elementary texts in Latin and other languages share this fault of density. The student can manage to memorize a translation of the passage and can learn to give the desired answers to the questions, but he is bewildered by the numerous unexplained contrasts.

In 1951 the Rockefeller grant was renewed, this time for the construction of a text to cover the first year's work in Latin at Penn Charter. Density was still an unsolved problem. The Pattern Practices covered 101 pages. There were more stories but still not enough; it was necessary to supplement them with filmstrips of traditional texts. There was no particular advance in sophistication in the Pattern Practices. They were still largely English-to-Latin, and, where they were Latin-to-Latin, they were faulty. For example, a student might be directed to change the noun in a series of sentences like *Equum videō* from singular to plural. The weakness of such a drill is that there is not the slightest reason to believe that the student knows what the contrast between *equum* and *equōs* means.

THE MICHIGAN LATIN WORKSHOP

In the summers of 1952 and 1953 the Carnegie Corporation supported a project called 'The Latin Workshop' under my direction at the University of Michigan. In all, 24 highly qualified Latin teachers worked with me during one or both summers improving and expanding the earlier material to solve the problem of density. The published results of our mutual endeavours were a first year text (*Latin Workshop Experimental Materials, Book One*), a second year reader (*Latin Workshop Experimental Materials, Book Two*), and an adaptation of the *Mostellaria*. For the first time, interested teachers could experiment with this new approach.

One feature of the first year text turned out to have unexpected value. At the close of each chapter we filled up the unused space with Latin quotations and mottoes. The success in using these *sententiae* led later to the concept of a Basic Text which could be the basis for Latin-to-Latin drills.

Audio-visual aids were closely integrated with the text. There were records of the Pattern Practices. The stories were all put on filmstrips in the colimetric manner explained above. There were pictures in the text illustrating the stories and demonstrating contrasting structures (Boy giving book to girl/Girl giving book to boy). Further pictures were made for use in a projector.

THE STRUCTURAL APPROACH

In the fall of 1953 I joined the faculty of the University of Michigan. With published materials finally available, I was at last free to experiment in new directions.

I decided to use no 'made' Latin at all for the readings but to choose *sententiae* and longer readings directly from classical, medieval, and renaissance literature for a Basic Text.

Further study had revealed the various ways in which a Latin sentence could be manipulated to construct Latin-to-Latin drills. There are three kinds of manipulation: substitution, expansion, and transformation. In the first, one substitutes a different lexical item of the same form class. There is no morphemic change, although there may be allomorphs. In the

Basic Sentence *Auctor opus laudat* one can substitute a nominative for *auctor*, either a noun with a zero allomorph like *ōrātor* or one with the *-s* allomorph like *quis?* or *Ovidius*. For *opus* can be substituted accusatives like *litterās* or *artem* but not *vestis* or *scrībit*.[6]

Transformation, however, involves morphemic change. As examples, we can transform the verb *laudat* in many different ways: *Ab auctōre opus laudātur, Ovidius dīxit auctōrem opus laudāre, Auctor opus laudābit, Utinam auctor opus laudet*, etc. We can transform *laudat* to another part of speech: *Laus auctōris opus ōrnat* or *Auctōrī cuique suum opus laudābile est.*

In expansion one adds (or subtracts) items. In most of the examples of transformation in the last paragraph there were expansions, like the addition of *Ab, Ovidius dīxit, Utinam*, etc. By use of these three processes one can change any Latin utterance into any other.

At last it was possible to explain how to ask questions and how to tell which questions were hard. The simplest sort of question involves only substitution, where the proper question word is substituted for the desired response. We can thus ask *Quis opus laudat?, Quid auctor laudat?*, and *Quid agit auctor?* For more complicated questions, one first changes the sentence, as we have done above, and then substitutes the proper question word, producing such questions as, *Cujus laus opus ōrnat?*

It was now possible to point out that *Sub quō locō?* is an easier question to answer than *Ubī?* because it requires simple substitution as an answer, namely another ablative like *quō locō* (*sub arbore, sub mūrō*, etc.). *Ubī?*, however, is a different part of speech from *arbore*; in our terminology it is a 'substitutor' (an indeclinable word which substitutes for a word or phrase which is inflected). In addition the student has to expand *arbore* with the preposition *sub*.

Pattern Practices now were (almost) exclusively Latin-to-Latin.

[6] Since case and number are inseparable in Latin ('portmanteau morphemes'), there is actually a morphemic change (singular to plural) when we substitute *litterās* for *opus*. This is an exception to the statement that substitution involves no morphemic change except lexical.

Understanding about expansion, we could add 'trigger words' to insure that the student understood the meaning of the transformations which he was producing. For example, in teaching the plural of nouns, it was now possible to ask the student to expand the sentence with the proper form of *ūnus* if the noun were singular or with the right form of *multī* if it were plural. The student had little trouble in equating *ūnus* with 'one' and *multī* with 'many' and thus knew that *ūnus auctor* is singular and *multī auctōrēs* is plural. Transformation, combined with expansion, produced such drills as *Volō tē fidem servāre* changed to *Fidem servā* to teach the imperative.

The Basic Text served three purposes:

1 it illustrated new structures,
2 it introduced vocabulary which would reappear in connected readings later in the course, and
3 it furnished the raw material for manipulation in the Pattern Practices.

In choosing the *sententiae* for the Basic Text the concept of 'yield' became clear, namely, what order of structures would be the most efficient in furnishing the greatest amount of Basic Text. Because of this criterion, certain structures which had been introduced early in the course (deponents, for example) were postponed.

The first version of this text was written in mimeographed form in 1954 and covered only the noun system and the infinitive. It was followed in the fall by *A Structural Approach to Latin* (also mimeographed), which covered essentially all Latin structures in 279 pages. In 1957 The University of Michigan Press published *Latin: A Structural Approach* (*pp.* 530), whose differences from the traditional approach may be summarized thus:

1 the Basic Text and all the Readings were taken from Latin authors and not constructed *ad hoc*,
2 drills were almost entirely in Latin, consisting of both Pattern Practice and questions on the Basic Sentences and the Readings,
3 grammatical explanations were structurally oriented,

4 the order of items was determined primarily by yield and not by tradition, and
5 there were tapes to be used optionally with the Pattern Practices.

Unfortunately, time did not permit the construction of any new visual material for the text except for a few drawings illustrating structural contrasts or vocabulary. Also, there were no connected readings until the student progressed far enough to read selections from Latin authors. It was expected that teachers would use the visual aids from the *Experimental Materials*.

Meanwhile, work was also in progress on more advanced levels. There were recordings of classical prose and poetry and numerous types of drills, particularly for Virgil and Ovid. New techniques were tried, improved, adopted, or discarded. A book for teachers explaining the differences between Latin and English was issued in three mimeographed versions for use in our classes at Michigan. There was a lexicon of Virgil with definitions entirely in Latin. Most of this material is still unpublished because of the time spent on the *Artēs Latīnae* programme.

The University of Michigan Press published *Vergil's Aeneid: A Structural Approach* in 1960 and *Clozes and Vocabulary Exercises for Books I and II of the Aeneid* in 1961. The 1960 publication presented the text of the first two books of the *Aeneid* with a Latin paraphrase on the facing page and notes from the ancient commentators like Servius. In the 1961 publication, the term 'cloze' is taken from psychology. It is formed from the word 'closure', which is used by some writers to describe what occurs when an organism connects two events in a series when one or more of the intermediate steps have been omitted. Using this device, the book gives the text of the first two books of the *Aeneid* with first one removal in a line, then two, next three, and finally four, in the following way.

> Here are the first seven lines of the *Aeneid* with four sets of removals. Note that the item that is removed in the first set continues to be removed in all subsequent sets. The progressively more difficult text forces the student to recall the original and reinforces the memory patterns.

Set One

Arma virumque canō, Troj-- quī prīmus ab ōrīs
Ītaliam fāt- profugus Lāvīnaque vēnit
lītora (multum ille et terr-- jactātus et altō
vī super--, saevae memorem Jūnōnis ob īram,
multa quoque et bellō passus, dum cond---- urbem
inferretque deōs Lati-), genus unde Latīnum
Albānīque patrēs atque alt-- moenia Rōmae.

Set Two

Arma virumque canō, Troj-- quī prīm-- ab ōrīs
Ītali-- fāt- profugus Lāvīnaque vēnit
lītora (multum ille et terr-- jactā--- et altō
vī super--, saev-- memorem Jūnōnis ob īram,
multa quo--- et bellō passus, dum cond---- urbem
inferretque deōs Lati-), genus unde Latīn--
Albānīque patrēs atque alt-- m---ia Rōmae.

Set Three

Arma virumque canō, Troj-- quī prīm-- ab --īs
Ītali-- fāt- pro---us Lāvīnaque vēnit
līt--a (multum ille et terr-- jactā--- et altō
vī super--, saev-- memorem Jūnōnis ob īr--,
multa quo--- et bellō pas---, dum cond---- urbem
infe---tque deōs Lati-), genus unde Latīn--
Albānīque p---ēs atque alt-- m---ia Rōmae.

Set Four

Arma vir--que canō, Troj-- quī prīm-- ab --īs
Ītali-- fāt- pro---us Lāvīn-que vēnit
līt--a (mult-- ille et terr-- jactā--- et altō
vī super--, saev-- memorem ----nis ob īr--,
multa quo--- et bell- pas---, dum cond---- urbem
infe---tque deōs Lati-), genus -nde Latīn--
Albān-que p---ēs atque alt-- m---ia Rōmae.

For vocabulary drill the student is asked to replace the italicized words with the Virgilian original, as in this sample:

Bella virumque canō, Trojae quī prīmus ab ōrīs
Ītaliam fātō *exsul* Lāvīnaque vēnit
lītora (multum ille et terris jactātus et *marī*
vī *deōrum*, saevae memorem Jūnōnis ob īram,
multa quoque et bellō passus, dum *fundāret* urbem
inferretque deōs Latiō), *populus* unde Latīnus
Albānīque patrēs atque *celsae* moenia Rōmae.

Experience with clozes led to experiments with redundancy. How much of a given text could be removed and still be intelligible? Did the ability to solve clozes correlate with linguistic skills? What made one document harder to read than others?

Latin: A Structural Approach now seemed to have several weaknesses. While the Pattern Practices were now gratifyingly in Latin, they were still 'mim-mem'; that is, the student mimicked the teacher on the tape (or studied the text) until he had memorized the drill. There then followed a Self Test, where he was asked to perform similar but different tasks. There was an obvious gap between merely echoing a drill and constructing responses without any assistance. Errors on either the Self Tests or the questions on the Basic Text and the Readings went uncorrected until the student came to class. Although this was standard practice in school, it still seemed inefficient to allow errors to remain uncorrected for hours. Something needed to be done, but what?

PROGRAMMING

In October 1958 there appeared in *Science* magazine Professor B. F. Skinner's revolutionary article on programming, called 'Teaching Machines '(24 October 1958, 969-77). The use of the 'teaching machine' described in the article seemed to promise a solution to many of our problems. This device was not at all complicated. In size and appearance it resembled the carrying case of a portable typewriter. In the centre of the top was a window in which appeared a visual stimulus. On the right was a smaller window in which the student wrote his response. He then turned a handle, which simultaneously moved his answer under glass, advanced the original stimulus so that it was still visible, and revealed the correct response. The student was thus required to give an answer before looking at the answer; moreover, he was informed immediately whether his answer was right or wrong.

But more important than the 'machine' was the programme fed into it. According to Professor Skinner, the material should be carefully organized and broken down into small steps to minimize the chance of error.

My first experiment was to transfer all of the Self Tests and questions on the Basic Text and Readings to a teaching machine. The student studied the mim-mem Pattern Practice as before, but then proceeded to the machine. In this way he

had immediate 'feedback' on his performance, which 'reinforced' a correct response (increasing the chances of giving this correct response later) or 'extinguished' a wrong one (reducing the chances of giving the wrong response later).

Just as the student receives feedback on his work, so the programmer, examining hundreds of self-corrected responses from each student, can learn where the trouble spots are. The experience of the students began to modify the drills drastically. Sequences were now constructed which moved gradually from easy tasks, where the student received many 'clues' to the correct answer, to much more difficult ones, where there were few clues or none. By varying the amount of cluing it is possible for the programmer to control the error rate. This kind of feedback was never available to the author of previous textbooks.

In 1961 Encyclopaedia Britannica Films, Inc. asked me to prepare programmed materials for the first two years of high school Latin for publication in the fall of 1962. It is this material which has finally appeared as *Latin: Level One*, the core of the *Artēs Latīnae* programme. The published version is the fifth writing; it has been tested by several dozen teachers and more than a thousand students.

While *Latin: Level One* is a logical development of my previous work, it is as different from *Latin: A Structural Approach* as that book was from the traditional texts. It is impossible in the scope of an article to describe these differences. The reader is referred to *Latin: Level One* and to the Teacher's Manual which explains the rationale.

Briefly, however, it may be said that it is a linear programme of about 10,000 frames (a frame is a task) divided into 30 units and covering approximately the same structures which are traditionally covered in American high schools in the ninth grade. Seventh and eighth grade students will naturally take a little longer. These structures include the entire noun system and the indicative verb system in all persons in the active and the third person in the passive. It is constructed according to a theory of operant conditioning, involving immediate reinforcement and careful organization of molecularized material. The error rate for most students does not exceed 5 per cent. It is multi-sensory, employing oral-aural and written work,

with visual stimuli. The drills are massive and varied, requiring Latin responses from Latin or visual stimuli. English is used mainly to prepare the students for the drills, to explain the contrasts between English and Latin, and to check on comprehension of the Basic Text. A rapid worker can do as many as 200 frames per hour. No teaching machine is used; improved techniques of programming have brought us to a point where most (but not all) students can be trained to cover the answer and work on the task until they have come up with a solution. The use of a tape recorder for oral-aural work is optional.

It has been repeatedly observed by teachers who have used *Latin: Level One* and by experts in the field that the most distinctive feature of this material is the motivation which is built into it. Students who have never 'learned to study' are shown how to work.

This programmed material permits the student to learn by himself and at his own pace much of what he used to be taught in class. The teacher has an opportunity to present different learning situations from those which are found in *Latin: Level One*. It should be emphasized that in no way does this adoption of programmed learning replace the teacher; its use, however, does free him from much routine drill work and allows him to engage in other activities. The other components of *Artēs Latīnae* include filmstrips, study prints, reader, reference notebook, tests, all closely integrated with *Latin: Level One*, as well as films for enrichment. The teacher may ask the students questions in Latin about the filmstrips, read with them new material adapted to their level, and discuss the Roman world as presented through the films.

FUTURE DEVELOPMENTS

Latin: Level Two is now almost complete in a testing version. In it the remaining structures of Latin are learned; the proportion of reading to drill constantly increases. Martial and Phaedrus are the authors read in the first part. The teacher then has the option of sending the students to programmes where they will learn either Caesar or Ovid (or both). We hope to be able to continue with programmed materials for such authors as Cicero and Virgil. *Latin: Level One* and *Level*

Two place much more stress on aesthetic criticism than the traditional texts, and it is planned to emphasize this aspect of literature even more heavily in the more advanced courses.

It seems certain that further discoveries in learning theory and linguistics will continue. But educational technology already has presented us with more tools than we are yet able to use. The computer is an obvious example.

At present the chief weakness of programmed instruction is this. There are students, intellectually able, who do not learn programmed Latin (or other academic subjects) for one or more of the following reasons:

1 if they cannot solve the problem immediately, they turn to the answer without first going back to try again,
2 if they make a mistake, they do not see that their answer was wrong, and consequently this wrong learning is not extinguished, or
3 if they do see that their response was wrong, they do not take corrective measures to learn.

Such students could be directed to a computer-based system. The programme would be essentially the same as *Latin: Level One*, except that written answers would not be printed in the text. The student would type all written answers upon an electric typewriter linked with a computer. On the paper in his typewriter would appear what he had typed, but through the assistance of the computer any error would be indicated, perhaps through contrasting type or colour. A wrong answer would lock the computer until the correct answer was typed. The student would thus first have his attention called to the fact that he had made an incorrect response and would then have to produce the correct answer. If the student was in fact unable to answer the question, he would be able to unlock the computer and proceed, but this action would result in some such information as this appearing on the page before him: 'The correct answer to the question, "*Quis scrīpsit omne opus ab auctōre laudārī?*" was "*Ovidius*". Be sure to learn this question-and-answer now, because it will occur on the test at the end of this Unit. Go to your teacher if you do not understand either the question or the answer.' Part of the final

testing version of *Latin: Level One* was fed into a computer last spring in a somewhat less sophisticated version.

An improved system, for which most of the knowledge is already available, would analyse the error and shunt the student to a remedial track. A simple sort of analysis, which might prove adequate, would be as follows. If the mistake was in the last two letters of a word, the computer would request the student to review morphology. If the mistake was in the lexical part of the word (i.e. anything but the last two letters) the student would be presented with a vocabulary review. This review would probably be displayed on a cathode tube, with the student typing the answer for analysis by the computer.

Such a system would also permit a student to ask for assistance before giving his answer, a review of morphology, perhaps, or of vocabulary. It may be that he needs to have the directions explained, to be told, for example, that *Quō cōnsiliō* expects as an answer *ut* (or *nē*) plus the subjunctive.

Educational technology has outstripped the authors. We have beautifully designed equipment for which no adequate programmes are yet available. As you read these words, it would be possible, *if the computer were properly programmed*, to have a student prepare his day's assignment as follows. He would go to an individual study carrel, where he would dial for a colour film to be projected in his booth. This film might be an archaeological history of the Roman Forum, beginning with views from Renaissance times. Through animation the student would see first the uncovering of the ancient monuments and then their restoration, followed perhaps by a history of their destruction. Accompanying this would be a Latin sound track.

When he had viewed this film as many times as he wished, he would dial for a filmstrip which reproduced some of the shots of the film. He would then be requested (in Latin) to indicate different buildings with a pencil light. This light, falling on the cathode tube on which the picture was projected, would be fed into the computer, which, working simultaneously on a thousand different problems, would instantaneously analyse his answer and if necessary direct him to remedial loops. He could be given the option of continuing with the

programme as laid out or of going on certain by-ways ('If you would like to know who some of these men are whose names are attached to these monuments, dial CLS 1153.').

In this particular subject of archaeology he could work in three dimensions. Furnished a ground plan of the Forum and models of the monuments, he would be asked to place a building on its site. The computer would inform him immediately whether it was the correct building (and the model of the specified date) and the correct location.

CONCLUSION

Learning is both a solitary process and a social process. Programmed learning is concerned with what happens when a student sits down by himself to 'study'. We are all familiar with the way in which we 'communicate' with an author long dead. But just as no author, no matter how gifted, can ever replace human relationships, so programming can never replace the interaction between teacher and student. But the converse is true: no teacher can do everything for the student. There is a certain amount which he must learn by himself, and here programmed materials seem to offer the biggest opportunity since the invention of printing.

WALDO E. SWEET
is Professor of Latin
and the Teaching of Latin
at the University of Michigan

Selected Bibliography

'The Horizontal Approach', *Classical Weekly*, 43 (1949-50), No. 8 (January 1950), 118-21.
'Celluloid and Shellac', *Independent School Bulletin* (January 1950), 10-11.
'The Horizontal Approach Applied to Verbs', *Classical Weekly*, 44 (1950-51), No. 1 (November 1950), 5-7.
'Latin Without a Dictionary', *Classical Outlook*, Vol. 28 (1950-51), 28-30.
'It's Me, O Lord!', *Classical Journal*, Vol. 46 (1950-51), No. 6 (March 1951), 322-4.
'The Key Difficulty in First Year Latin', *Independent School Bulletin* (May 1951), 5-8.
'A Linguistic Approach to the Teaching of Latin', *Language Learning*, Vol. 4 (1951-52), Nos. 1 and 2, 42-54.
'The Use of Macrons in Texts', *Classical Weekly*, 46 (1952-53), No. 13/14 (April 13-20, 1953), 205.

Latin Workshop Experimental Materials, Book One (Ann Arbor: The University of Michigan Press, 1953), *pp.* 304. Revised edition (1956) *pp.* 247. Second revision (1963) in 2 vols. under new title, *Elementary Latin: The Basic Structures, Part I and Part II*, ed. G. Crawford, C. Ashley, J. Infield, F. Kempner (Ann Arbor: The University of Michigan Press) *Part I pp.* 231, *Part II pp.* 240.

Mostellaria (*The Haunted House*), An Adaptation of the Play by T. Maccius Plautus (with L. Voelkel). (Ann Arbor 1953), *pp.* 64.

Latin Workshop Experimental Materials, Book Two (Ann Arbor: The University of Michigan Press, 1954), *pp.* 306. Revised edition (1957), *pp.* 306.

'A Substitute for Prose Composition in the Teaching of Latin', *Language Learning*, Vol. 6, Nos. 3 and 4 (1956), 7-16.

Latin: A Structural Approach (Ann Arbor: The University of Michigan Press, 1957), *pp.* 530.

The Structural Approach to Latin (Ann Arbor: The University of Michigan Press, 1959), 8 *pp.* pamphlet. (Available from author.)

'The Carrot on the Stick', *Language Learning*, Vol. 9, Nos. 1 and 2 (1959), i-ii.

Vergil's Aeneid: A Structural Approach (Ann Arbor: The University of Michigan Press, 1960), *pp.* 172.

'The Structural Approach Applied to Vergil', *Vergilius*, No. 6 (Fall 1960), 15-23.

Clozes and Vocabulary Exercises for Books I and II of the Aeneid (Ann Arbor: The University of Michigan Press, 1961), *pp.* 102.

'Programmed Learning', *Language Learning*, Vol. 11, Nos. 3 and 4 (1961): v-ix; also in *MLAbstracts*, No. 6 (August 1962): Abstract 302. Also in *Theory and Practice in English as a Foreign Language* (Ann Arbor: The Research Club in Language Learning, 1963), 60-72. (Reprints available from author.)

'The Choice of Syntactical and Morphological Discriminations in an Elementary Latin Program', *Programming of Audio-Lingual Language Skills for Self-Instructional Presentation*, University of Michigan Language Laboratory Series Preprints and Reprints, Vol. 6 (Fall 1961), 63-73.

'A New Look at Learning' (with A. Hayes, H. Lane, and T. Mueller), *Current Issues in Language Teaching*, Report of the Working Committees, 1962 Northeast Conference on the Teaching of Foreign Language, 18-60; also in *MLAbstracts*, No. 6 (August 1962): Abstract 235.

'APA Panel on New Approaches to Teaching Latin and Greek', *Classical Journal*, Vol. 57 (1961-62), No. 5 (February 1962), 202-30.

'Construction of Pattern Practice in an Inflected Language', *Studies in Language and Linguistics* in honor of Charles C. Fries, ed A. Marckwardt (Ann Arbor: The English Language Institute, 1964), 135-53. (Reprints available from author.)

Latin: A Structural Approach. Revision with R. Craig and G. Seligson (Ann Arbor: The University of Michigan Press, 1966), *pp.* 521.

Latin: Level One, programmed learning materials in *Artēs Latīnae* program. Chicago, Encyclopaedia Britannica Films, Inc., 1966. 2 vols., approx. 800 pp., quarto.